Orthodontic-surgical treatment of bilateral maxillary canine impaction

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Abstract

A 13-year-old female patient reported with the chief complaint of irregular front teeth. She had a skeletal Class III and Angle's Class I malocclusion with hyperdivergent growth pattern and bilateral impaction of maxillary canines. Surgical exposure of the impacted teeth and orthodontic alignment was planned. The surgical exposure was done by a minimally invasive modified window technique. Orthodontic treatment of impacted canines without causing significant morbidity to the adjacent teeth and periodontium is a challenge. The bilaterally impacted maxillary canines were successfully aligned and leveled. The depth of the gingival sulcus and clinical crown heights of disimpacted teeth were normal post-treatment and after 1 year of retention.

Keywords: Impacted maxillary canines, incisor root resorption, modified window technique, surgical exposure

Introduction

The maxillary canines are one of the most important teeth in terms of esthetics and function. After the third molars, the maxillary canines are the second most frequently impacted teeth. The prevalence of impacted maxillary canines is in the range of 0.8 - 2.8%.[1-3] The incidence of canine impaction in the western population is 85% palatal and 15% buccal.[4] The incidence of bilateral canine impactions is 8%.[5] In the Asian populations, the buccally impacted canines are more common.[6] A high prevalence of maxillary canine impactions is found among females with a range of 2.3:1 to 3:1.[1,7,8] A study of the distribution of individual tooth impaction in general dental patients of Northern India revealed that the most frequently impacted teeth were maxillary canines (52.27%).[7]

Alignment of impacted canines with minimal morbidity of the adjacent teeth and periodontium is a challenge to an orthodontist. This case report describes the successful management of bilateral maxillary canine impaction with a minimally invasive surgical approach.

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Diagnosis and Etiology

A 13-year-old female patient reported with the chief complaint of irregular front teeth. Extra-orally, she had a leptoprosopic face, mild convex profile, competent lips, and a steep mandibular plane. Intra-orally, the patient had an Angle's Class I malocclusion with mild mandibular incisor crowding, reduced overjet, retroclined maxillary central incisors and proclined lateral incisors, over-retained deciduous canines, first and second molars, crossbite in relation to maxillary left permanent first molar, lower midline shift to the left side by 2 mm, and deep overbite [Figure 1].

The pre-treatment orthopantomogram [Figure 5] showed bilaterally impacted maxillary permanent canines with dilacerated roots. The cephalometric analysis revealed a skeletal Class III malocclusion with hyperdivergent growth pattern and retroclined maxillary and mandibular incisors [Figure 5 and Table 1].

The etiology of impacted canines was over-retained deciduous canines and abnormal mesial inclination of the permanent canines. The etiology of skeletal Class III malocclusion was familial.

Table 1: Cephalometric measurements

Variables	Pre-treatment	Post-treatment
SNB	81°	81°
SNB	78°	78°
ANB	3°	3°
Wits Appraisal	-5 mm	-5 mm
FMA	31°	31°
MM	32°	32°
1 to PP	112°	117°
IMPA	79°	82°
1 to 1	138°	130°
Nasolabial Angle	119°	104°

Figure 1: (a, b) Pre-treatment photographs

Figure 2: Surgical exposure of the canines

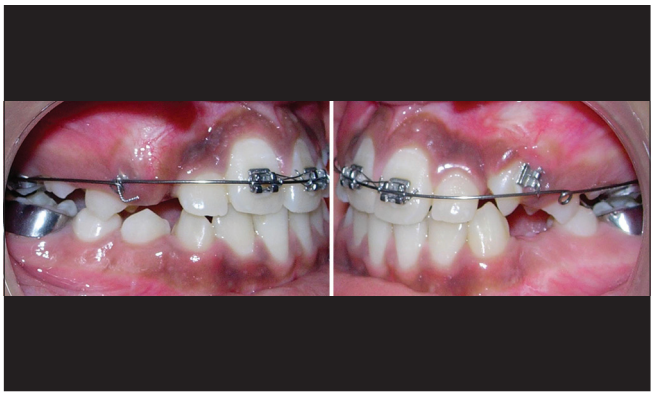

Figure 3: Progress of disimpaction

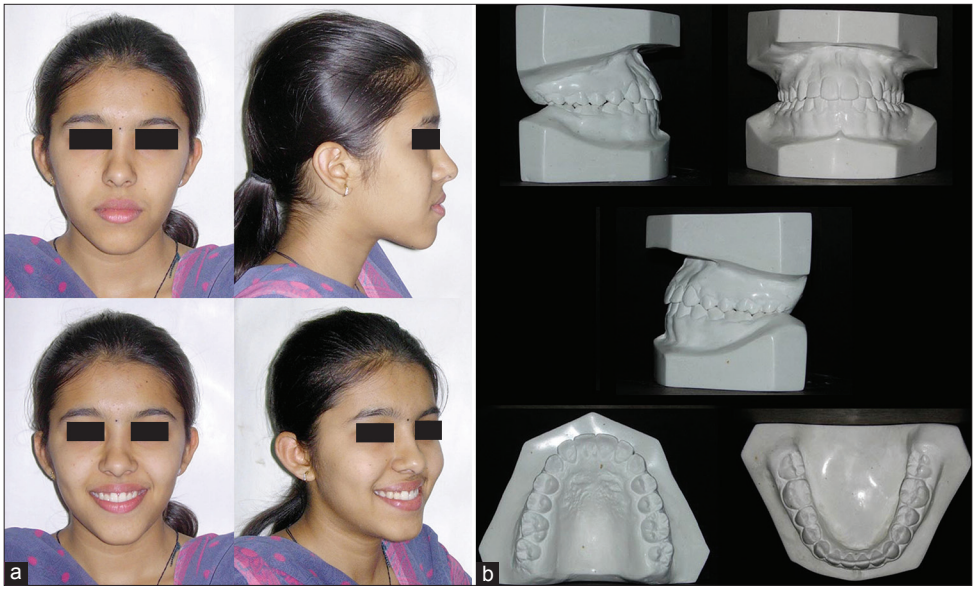

Figure 4: (a, b) Post-treatment photographs

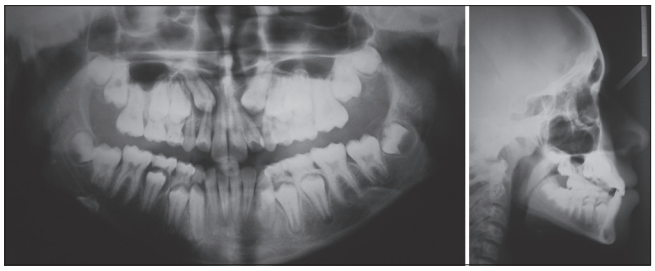

Figure 5: Pre-treatment radiographs

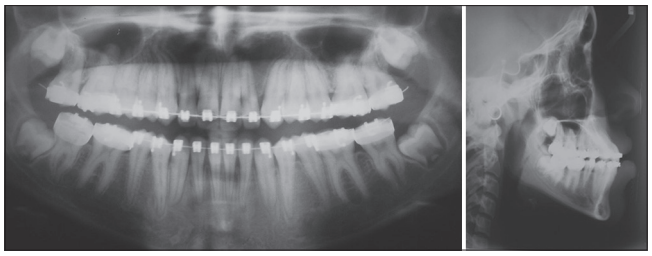

Figure 6: Progress radiographs

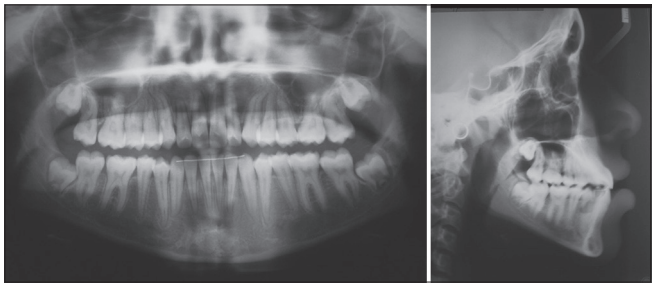

Figure 7: Post-treatment radiographs

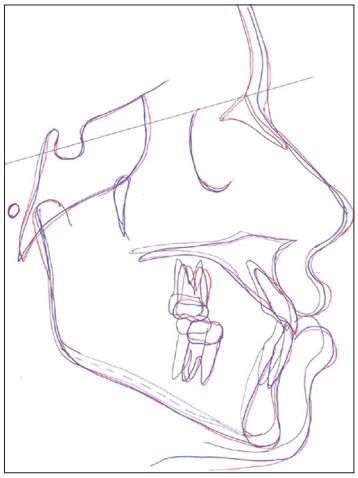

Figure 8: Pre-, progress, and post-treatment cephalometric superimpositions

Treatment Plan

Surgical exposure and orthodontic alignment of the impacted maxillary canines was planned. This was the primary treatment objective. Extraction of all the over-retained deciduous teeth and utilization of Leeway spaces to correct arch length tooth size discrepancy was planned.

Treatment Progress

A pre-adjusted edgewise appliance, MBT- 0.022″ prescription was used. Treatment was started in the maxillary arch with bands on the first molars and brackets on the central incisors. The lateral incisors were not bonded initially to avoid damage to their roots during canine disimpaction. The initial alignment and leveling was achieved with 0.016″ Niti archwire. The canines were surgically exposed and bonded during the 0.018″ AJ Wilcock archwire stage [Figure 2]. The impacted canines were surgically exposed with Boyd's modified window approach labially, as it is less invasive than raising a full thickness flap bilaterally.[9] The maxillary deciduous canines were extracted immediately after bonding the Begg brackets on the exposed teeth. The ligature wires were tied from the bonded attachments on canines in a distal direction to avoid damage to the roots of the lateral incisors. The window approach closely simulated the closed eruption technique. The labial inclination of the maxillary lateral incisors reduced spontaneously as the canines moved downwards [Figure 3]. In the mandibular arch, the over retained deciduous teeth were extracted during the initial stage of treatment and a lingual arch was used to maintain space [Figure 3]. The alignment and leveling was completed with the 19-25 niti and stainless steel archwires. The lower arch was bonded after creating sufficient overjet by correction the axial inclination of maxillary incisors during the 19-25 stainless steel archwire stage.

Progress lateral cephalogram did not show the worsening of the facial profile and skeletal Class III pattern. Therefore, it was planned to finish the case with a mild dental compensation to camouflage the skeletal Class III malocclusion. The second molars were also aligned and leveled in the finishing stage. Settling of occlusion was done with 0.016″ AJ Wilcock archwires and short Class III elastics. Maxillary wrap around retainer was given, and mandibular canine-to-canine retainer was bonded [Figure 6].

Results

Bilaterally impacted maxillary canines were aligned successfully without adversely affecting the periodontium and adjacent teeth. A marked improvement in facial esthetics and dental occlusion was achieved [Figures 4]. Though the impacted teeth were very close to the central and lateral incisors, the incisors' root resorption was not significant [Figures 5 and 7]. The molars and other teeth also did not have abnormal resorption. Good vertical control was maintained during treatment. [Figure 8 and Table 1]. As she had a mild skeletal class III malocclusion, mild dental compensation was planned to mask the skeletal discrepancy. She had a good

facial balance and consonant smile at the end of treatment. Treatment results were stable after 1 year of retention. The periodontal status of the maxillary canines was normal at the end of treatment and 1 year post-treatment.

Discussion

The diagnosis and localization of the impacted teeth is the most important step in the management of impacted teeth. Various treatment options for an impacted tooth are: Surgical exposure and orthodontic alignment, auto transplantation, surgical removal followed by prosthetic replacement and no treatment – periodic evaluation for pathological changes.[8,10-12] Surgical exposure and orthodontic alignment was chosen for this case as it gives the most satisfactory result in the long-term.[8]

The surgical techniques to expose the impacted teeth are-the open eruption and closed eruption techniques.[13-17] In this case, a conservative window technique suggested by Boyd was followed.[9] The patient had mild pain after surgery, and healing was good. The only disadvantage of this technique was scarring of gingiva, but that was not esthetically compromising.

The general principles of mechanotherapy for treatment of impacted teeth were followed for this case.[8] The duration of treatment bilateral canine impactions is longer.[8,18] In this case, impacted maxillary canines were completely aligned and leveled within a reasonable period of 16 months after surgical exposure.Incisor root resorption is a common complication in the management of canine impactions.[19,20] Incisor root resorption was not significant in this case, as the orthodontic traction was well planned, with light orthodontic force in a distal and downward direction.CBCT is more sensitive than conventional radiography for both canine localization and identification of root resorption of adjacent teeth.[21] The disadvantages of CBCT are high radiation exposure and increased cost. Even with the use of advanced diagnostic aids, the method of orthodontic traction would not have differed much for this case.

Conclusions

Accurate localization, conservative management of the soft tissues, rigid anchorage unit, and the direction of the orthodontic traction are the important factors for the successful management of impacted canines.

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